NAME:

For the following exercises, read the problems carefully and show all your work. Attach more pages if necessary. Avoid using a calculator or the computer to solve the exercises. Please, staple your homework.

1 Continuity

Identify which of the following functions are continuous. For functions that are not continuous, identify the points of discontinuity.

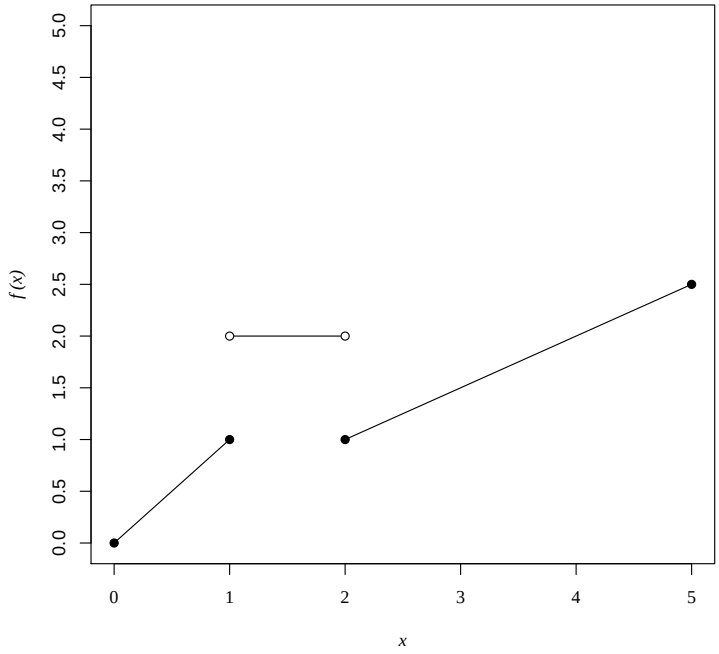
1. $f(x) = x^2$

2. $f(x) = \dfrac{1}{x}$

3. $f(x) = \dfrac{x-3}{x^3-27}$

4. $f(x) = \begin{cases} x^2 & \text{for } x < 1 \\ x & \text{for } x \geq 1 \end{cases}$

5. The function depicted below:



2 Derivatives and Slopes

For each function, find its derivative:

1. $f(x) = \frac{1}{3}x^3$

2. $f(x) = \dfrac{x}{e^x}$

3. $f(x) = \dfrac{x^2 - 1}{x - 1}$

4. $f(x) = x^2(x - 1)$

5. $f(y) = (1 - 1/y^2)$

6. $f(y) = (y^3 - 7)(1 - 1/y^2)$

7. $f(x) = ln(2\pi x^2)$

8. $f(y) = (y - y^{-1})(y - y^{-2})$

9. $f(x) = x^6 + 5x^5 - 2x^2 + 8$

10. $m(x) = \dfrac{1}{1 + \exp(x)}$

11. $y = 27x^3 + 5x^2 - x + 13$

12. $y = 81x^2 + 10x - 1$

13. $y = 162x + 10$

For these functions, find the derivative at $x = 1$ and $x = 3$

14. $f(x) = 2x^2 + 7$

15. $f(x) = x^3 - x + 1$